Examiners' Report/
Principal Examiner Feedback

January 2014

Pearson Edexcel International GCSE
in Biology (4BI0) Paper 1B
Science Double Award (4SC0) Paper 1B

Edexcel Level 1/Level 2 Certificates
Biology (KBI0) Paper 1B
Science (Double Award) (KSC0) Paper 1B

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January 2014
Publications Code UG037580

4BI0 & KBI0 (1B) Principal Examiners' Report – January 2014

General

The examiners were impressed by the knowledge and understanding shown by many of the candidates on the papers. Candidates were able to demonstrate application of knowledge and understanding, analysis, evaluation and investigative skills. Centres have worked with candidates to prepare for the examination and this was evident in the responses of many candidates. The better candidates had little difficulty in applying their knowledge to new situations and novel contexts. Only a small number of candidates failed to attempt questions.
The papers gave a balance of question types and topics and the proportion of marks for each Assessment Objective matched those published in the specification.

Question 1

This required candidates to complete a table to show some of the features of bacteria, fungi and viruses. Most candidates knew that not all bacteria or fungi are pathogenic and that viruses do not respire but did less well on the presence of a protein coat or containing DNA in a nucleus.

Question 2

This provided candidates with data from a familiar experiment to determine the rate of photosynthesis in a water plant. In part (a) they had to give two reasons why the data are reliable. Almost all candidates could discuss the petition of readings and many also cited the similar pattern of results. Only the best responses noticed that one anomalous reading for blue light was not included in the calculation of the average rate. In part (b) many responses suggested how the apparatus could be modified to measure the rate more accurately, such as using a gas syringe or a measuring cylinder to collect the oxygen released. In (c) only the best candidates could give colour of light as the independent variable that the student changed in this experiment. Many candidates failed to earn the mark by giving light as the independent variable without any reference to colour. In (d) most candidates could name two or three control variables such as the mass and species of plant, the temperature of the water and the concentration of carbon dioxide in the water.

Question 3

This question showed a diagram of the heart and in (a) (i) candidates had to name the organ that blood from a labelled vessel was transported to. Most could correctly identify the lungs. In (ii) many candidates could state one change in blood in this organ that it became oxygenated, but only a few could add that it loses carbon dioxide. Most could give the function of the

valves in part (b). Part (c) presented candidates with a diagram showing contraction and relaxation of the atria and ventricles. Most candidates could correctly interpret the diagram to determine how long the ventricles contracted for and the number of heartbeats shown, however, only the best candidates could work out the heart rate from the diagram.

Question 4

Here candidates had, in (a), to complete a table to show the genotype, alleles and phenotype of individuals with polydactyly. Almost all candidates could do this with a few failing to earn full credit by describing 'dd' as homozygous rather than as homozygous recessive. In part (b) about half of the responses gained full credit for correctly calculating the probability of each mating producing a child with polydactyly. Some candidates failed to earn credit by expressing their answer as a fraction or a percentage when the format shown was a decimal.

Question 5

This was a prose question where candidates had the opportunity to demonstrate their knowledge and understanding of the stages used to produce a cloned mammal. The candidates who had learned and understood this procedure had no problem in gaining full marks. Unfortunately some candidates tried to describe genetic modification using vectors.

Question 6

The question showed a food web from leaf litter and in (a) candidates could usually correctly identify the number of trophic levels, food chains, predators and consumers. Part (b) showed a Tullgren funnel and in (i) candidates had to suggest why the insects moved away from the light source. Most could identify one stimulus with the best responses naming both heat and gravity as the stimuli the insects are exposed to. In part (ii) most candidates could state the difference in the number of millipedes from the two areas and the better responses could explain the difference in terms of food availability or response to light, temperature or predators. Some candidates wrote about shelter or being safe but did not explain from what. In (iii) most could draw a quadrat with a few responses from candidates that had never seen, let alone, used a quadrat.

Question 7

Candidates were asked about gas exchange in fish. In (a) (i) about half of the responses could correctly describe gas exchange as the absorption of oxygen and release of carbon dioxide by the blood. This could be expressed in a number of acceptable ways. Some candidates wrote about exchange of gases but did not specify oxygen and carbon dioxide or described

ventilation. In part (ii) only the best candidates were able to suggest that in order to enable efficient gas exchange the gills would need to have a large surface area, be thin walled and be permeable with a rich blood supply from a capillary network. In part (b) (i) candidates had to plot a graph of how average breathing rate changes with temperature. Many candidates were able to gain full credit. The most common errors that featured were incorrect axis and poor choice of scale leading to plotting errors. Some candidates failed to include units and therefore lost credit. In (b) (ii) most could explain how in increasing water temperature the rate of breathing increases. In part (iii) most candidates could explain that larger fish may require more oxygen and this may affect their breathing rate. In (iv) most candidates could one factor that needed to be controlled and the best candidates could name two factors.

Question 8

For this question candidates were given a description of an experiment to investigate the effect of size on movement of molecules. In (a) almost all candidates could explain why safety glasses should be worn. In (b) many candidates could explain the movement of the dye by diffusion from an area of higher concentration of molecules to an area of lower concentration. Weaker candidates wrote about osmosis. In part (c) about half of the candidates were able to measure the distance moved by the dye accurately. In part (d) candidates had to calculate the surface area and volume of cube A. Candidates tended to do better on the calculation of volume than they did on surface area, some candidates were unable to select the appropriate units. For part (e) most responses could correctly identify the cubes with the largest surface area and the greatest proportion of cube coloured but had more difficulty with the largest surface area to volume ratio. In part (f) only the very best candidates were able to score two or three marks for their explanation of how the experiment demonstrates the need for transport systems in larger organisms.

Question 9

This was the experimental design item and it was pleasing to note that most candidates wrote their responses in sentence and explained their methods. The topic of the investigation proved difficult to many candidates and they struggled to describe a suitable method to compare how green the leaves were. The best candidates described how they would collect samples of similar sizes leaves from the top and bottom of several trees of the same species growing in the same location. They would then extract the chlorophyll from the same mass of leaves using warm ethanol.

Question 10

This question described the adaptations of the Arabian Oryx. In part (a) most candidates gained some credit for suggesting that the oryx are less active in summer because of the higher temperatures and better responses included reference to reduced sweating and less respiration. In part (b) most candidates also gained credit for suggesting why oryx feed mainly at night. In part (c) most candidates were able to identify plants as the source of water for oryx. Part (d) required the candidates to explain how humans and oryx are able to produce concentrated urine and thus conserve water. The best candidates were able to score full marks for a description of the osmoreceptors in the hypothalamus detecting an increase in blood concentration. The pituitary gland releasing more ADH which increases the permeability of the collecting duct walls in the nephron causing more reabsorption of water into the blood.

Question 11

The question stem described a selective breeding programme to develop sheep in New Zealand. In part (a) most candidates could suggest why flies are attracted to urine and faeces. In part (b) the best candidates scored well by describing how they would mate Cheviot with bare legs and East Friesian with bare backsides to produce sheep with both of these characteristics. Only the offspring with the desired phenotype would be mated and this would be repeated for many generations. In part (c) most candidates scored at least one mark by noting that in selective breeding humans choose the parents. The better candidates also earned a second mark by writing that selective breeding is a faster process than natural selection and that it does not select on the basis of being the fittest. For part (d) candidates were asked to give two problems with the use of pesticides. Only the best scored any marks with few responses including lack of specificity, effects on food chains and development of resistance.

Question 12

Candidates were given a diagram of an insect pollinated flower. In (a) almost all could describe three features of an insect pollinated flower. In (b) candidates had to select the correct word to complete the table about sexual reproduction in flowering plants and animals. Although most responses scored some credit candidates did less well on flowering plants especially the site of fertilisation and were the embryo develops. Part (c) required candidates to recall the differences between mitosis and meiosis with most gaining two or three correct points. In part (d) most candidates could gain one mark by giving an advantage to a flower grower of using asexual reproduction.

Question 13

This required a description of deforestation which almost all candidates could provide for (a) (i). For part (ii) candidates needed to explain the effect of deforestation on the balance of oxygen and carbon dioxide in the atmosphere. Again most could earn at least two marks for an increase in carbon dioxide and a reduction in oxygen. In (b) candidates had to match pollutant gases, their sources and their effects. The best candidates were able to score well but some candidates had little idea about methane, carbon monoxide or sulphur dioxide.

Question 14 (a)

This question required the word equation for anaerobic respiration in yeast. Many candidates gained full marks for this. In part (b) most were also able to describe a test to identify the gas produced.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
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